2014-09-02 day 5

19) If $3x+4y=7$ and $5x-4y=1$ find x,y

$$\begin{array}{r} 3x+4y=7 \\ 5x-4y=1 \\ \hline 8x=8 \end{array}$$

$x=1, y=1$

~~AND~~

Problem: More than 1 variable (to find)

Strategy: Find the value of 1 variable, substitute it in, Voilà! our problem is simpler.

Next easiest: " " w/3 variables

Next easiest: Solve eq^n w/2 variables

Easy: solve eq^n w/1 variable

Strategy ... find 1 guy 2014-09-02 day 5

We believe that if you have n variables to find, and n (or more) equations, the problem is "possible"

Notice that if we have fewer than n eq^{n}s, some of the sol^{n}s are "dependent" — they must be expressed in terms of some of the other vars

2014-09-02 day 5

If we are talking about simul. eqⁿ in 2 variables
goal: eliminate 1 of them.

how we do this is to use 1 of the eqns as a "crowbar" to force chgs in the other eqⁿ.

You can view both of these methods as substitution.

Substitution relies on "equivalence" or an equality between 1 thing and another

"obvious substitution"

$y = f(x)$; $y = g(x)$

points of intersection {"solutions"} are given by solving $f(x) = g(x)$

you can also view

$x = \bar{f}(y)$, $x = \bar{g}(y)$

Slick and smart substitution

2014-09-02 day 5

19) $3x+4y=7$; $5x-4y=1$

$4y=7-3x$ $4y=5x-1$

$7-3x=5x-1$

$\boxed{8=8x}$

Rule If (x,y) is a solution of $y=f(x)$, then (x,y) is ALSO a solution of $cy=cf(x)$. $(c\neq 0)$

2014-09-02 day 5

20) $4x-y=1$; $2x+y=5$; $3xy=$

$6x=6$; $x=1$; $y=3$; $3xy=3(1)(3)$
$=9$

21) $y+4x-5=0$; $y=x^2$

$x^2+4x-5=0$

$(x+5)(x-1)=0$; so $x=+1,-5$
$y=1,25$

James Tanton. www.gdaymath.com

complete course on quadratics

All you all should do this

When you add 2 equations together, you have to do that legally

If you are combining like terms, then remember that the like terms have to be on the same side of the equal sign.

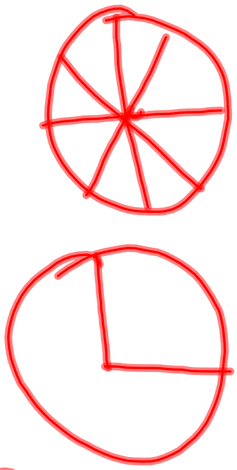
$$\begin{array}{r} 3x+4y=7 \\ +\,(5x=1+4y) \\ \hline 8x+4y=8+4y \end{array} \qquad \begin{array}{r} 3x+4y=7 \\ -\,(5x \quad =1+4y) \\ \hline -2x+4y=6-4y \end{array}$$

2014-09-02 day 5

22) the radian measure of an angle of 60° is ...

If I divide a circle up into equal pieces, all including the center,

then: I can measure angles.



FACT: ALL such subdivisions are completely arbitrary.

- surveyors
- military (artillery)

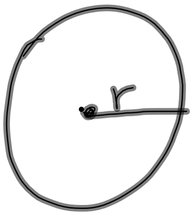
100 grad = 90°

great idea for senior project: pizza-sized cookie cutters

2014-09-02 day 5

People actually thought about about what ~~the~~ most "natural" [we use the word 'canonical'] division of a circle would be.

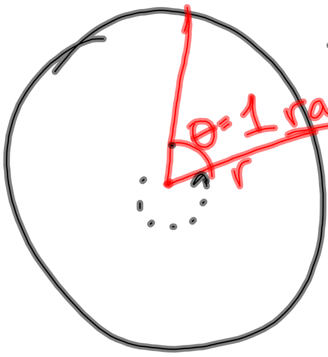
Who? Spacemen.



$C = \pi d = 2\pi r$

$A = \pi r^2$

r, center



$\theta = 1$ radius angle

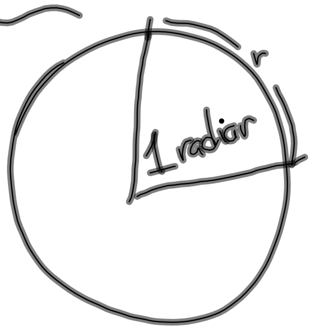
popular names for baby angles

α

θ

β

how many radians = a complete circle.



total circumference $= 2\pi r$

1 radian sweeps out $= r$

$\frac{2\pi r}{r} = 2\pi$ radians in a circle

$\cancel{2}\pi$ radians $= \cancel{360}\ 180°$

$\boxed{\pi \text{ radians} = 180°}$

1 radian $= \frac{180°}{\pi} \approx 57.3°$

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$$\frac{?}{\pi \text{ radians}} = \frac{60^\circ}{180^\circ}$$

$\frac{\pi}{180}$ or $\frac{180}{\pi}$

$$? = \frac{60}{180}\pi \text{ radians} = \frac{\pi}{3} \text{ radians}$$

convert 100° to radians. $\frac{100^\circ}{180^\circ} = \frac{x}{\pi \text{ radians}}$

$$100 \cdot \frac{\pi}{180} \text{ radians}$$

$\frac{5}{9}\pi$

how many complete revolutions of a circle are 100 radians?

1 complete turn $= 2\pi$ radians

$$\frac{100}{2\pi}$$

6.28
16

almost 16.

2014-09-02 day 5

23) $\sin(a) = 1$ $\cos(a) =$

$\cos(b) > 0$; $\sin(b) = \frac{1}{2}$ then $\boxed{\frac{\sqrt{3}}{2}}$

$$\sin(a+b) = \sin(a)\cos b + \sin(b)\cos(a)$$

$$(1)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{1}{2}\right)(0)$$

☆ $\sin^2\theta + \cos^2\theta = 1$

$(1) + \cos^2\theta = 1$

$\cos^2\theta = 0$

$\cos\theta = 0$

$\left(\frac{1}{2}\right)^2 + \cos^2 b = 1$

$\cos^2 b = 1 - \frac{1}{4} = \frac{3}{4}$

$\cos b = \frac{\sqrt{3}}{2}$

2014-09-02 day 5

23) $\sin(a) = 1$

$\cos(b) > 0$; $\sin(b) = \frac{1}{2}$ then

$\sin(a+b) =$

$(x, y) = (\cos\theta, \sin\theta)$

$\cos\theta = \frac{ADJ}{HYP} = \frac{x}{1} = x$